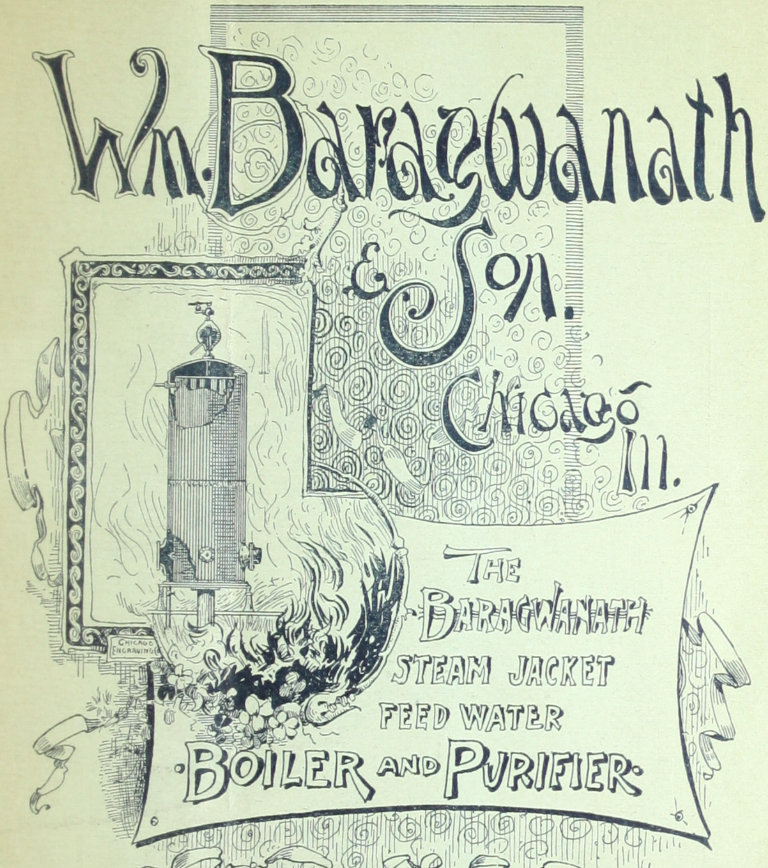
21.19

F. Head


CHICAGO ENGRAVING CO.

Wm. Baragwanath & Son.

Chicago Ill.

THE BARAGWANATH STEAM JACKET FEED WATER BOILER AND PURIFIER

PACIFIC BOILER WORKS
48-50-52 W. DIVISION ST.

CHICAGO ILL.

SANDY BROS. PRINTERS, 170 MADISON ST., CHICAGO.

BLOMGREN BROS. CHI.

THE LATE
WM. BARAGWANATH.

WM. BARAGWANATH & SON,

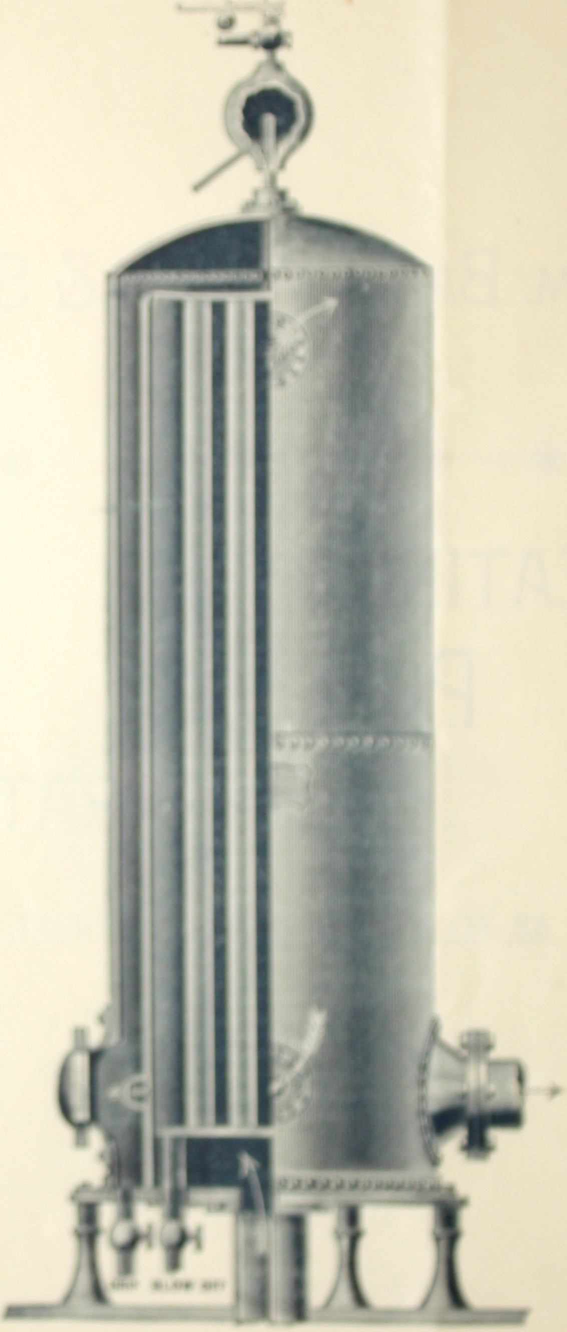
MANUFACTURERS OF

FEED-WATER

HEATING AND PURIFYING APPARATUS,

48, 50 AND 52 W. DIVISION STREET,

CHICAGO, ILL.


BLOW OFF

THE STEAM JACKET FEED-WATER BOILER AND PURIFIER.

THIS HEATER is in effect a plain tubular heater, surrounded by a jacket of steam. The exhaust enters at the bottom, passes up through the tubes, and returns on the outside of the shell, thus being utilized through twice the length of the heater, and entirely preventing radiation of heat from the water. The feed-water is fed in at the lower end of the shell, and drawn off at the upper. A hollow cast iron ball is provided and set at the top for the purpose of collecting and removing the scum which rises when the water is boiled. Suitable blowoffs, handhole, and drips are provided.

It is *non-radiating.* The whole of the shell, (which in other heaters is exposed to the cold air) is in contact with rapidly-passing steam and converted into heating surface.

It has more heating surface than any other heater of equal size.

It delivers its feed-water at or above boiling point, which no other heater can do.

It purifies the water.

It keeps the boilers clean in ordinary water.

It will not clog up.

It is the strongest and safest heater made.

It avoids the necessity of pumping hot water.

It is *simple in construction.*

It does not cause any back pressure, but, acting as a surface condenser, always *reduces any back pressure* that may exist.

It *saves boiler repairs.*

It *increases the steaming capacity* of the boilers.

It *saves more fuel* and will pay for itself in the saving of fuel in less time than any other heater. It is therefore the *cheapest* in the market.

It is the only exhaust feed-water *boiler.*

SAVING FUEL.

In calculating the saving to be effected by connecting one of our feed-water boilers it is necessary to consider :

First—The amount of fuel required to raise the feed-water from a temperature of say 60° F. to 214° or 216° Fahr.

Second—The greater efficiency of clean boilers. The best authorities place the loss of fuel resulting from the presence of scale 1-16 inch thickness at 13 per cent., of ½ inch thickness 60 per cent. That is, with scale ½ inch thick a boiler will only evaporate four-tenths as much water as when clean.

Third—The reduction of back pressure on the engine, which we have frequently found to be several pounds.

Fourth—The increased steaming capacity of the boilers, which permits of lighter firing, and consequently better combustion and economy of fuel.

Our experience in placing our feed-water boilers has shown us that the saving of fuel is approximately as follows :

Taking water at 33° F—from 20 to 40 per cent.
" " 140° F— " 15 " 20 "
" " 175° F— " 10 " 15 "
" " 200° F— " 5 " 10 "

PREVENTION OF SCALE.

It is an established fact that the impurities held in solution in water are not precipitated until the water is *boiled.* Prof. Chandler, of Columbia College, one of the most noted chemists in the country, in a recent report to the New York Central Railroad Company as to the best means of purifying water for use in steam boilers, says : "Water, when boiled, expels the free carbonic acid, and causes a separation of the carbonates of lime and magnesia, and ***if conducted at a high temperature and under considerable pressure, results in the almost complete precipitation of the sulphates of lime and other impurities.***"

It will be observed that special stress is laid upon the necessity of boiling water under pressure, before the the impurities can be separated. This is precisely what is accomplished in the Baragwanath Boiler, which is the only apparatus that has demonstrated the practicability of purifying water by the use of exhaust steam. A heater that does not *boil* the water cannot purify it. When water is boiled most of the impurities at first rise to the top in the form of scum, to collect and expel which, a scum chamber is attached to the top of our boiler, which is blown out four or five times per day. There are occasionally found in the feed-water some impurities which can only be separated by evaporation or by heating to a very high temperature. In these cases the only remedy is the use of our live steam feed-water purifier, illustrated on page 10, which heats the water to about the same temperature as that in the boiler. Only distilled water is absolutely pure, but water that has been boiled and the scum and sediment removed is for boiler use practically pure. *The simplest way to keep the boiler clean is to clean the water before it enters the boiler.*

SAVING BOILER REPAIRS.

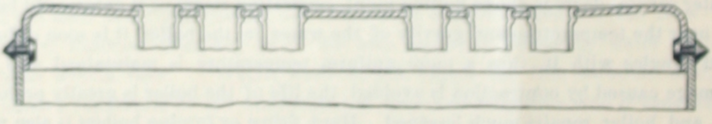
It is the opinion of many of our leading engineers that feeding cold water and the accumulation of scale are the prime causes of ninety per cent. of all boiler repairs ; and it is undisputed that the temperature and character of the feed-water is one of the main considerations in the working life of a boiler. The destructive and wasteful effects arising from the accumulation of mud and scale are universally recognized. The evil results of feeding cold or merely lukewarm water are equally pronounced. The scale keeps the water from contact with the sheets, which become overheated, resulting in blistered, burnt and bagged sheets, and springing the rivets and seams. When the boilers are fed with water at a low temperature, the colder water sinks to the bottom of the boiler and cools and contracts the plate, causing the seams to leak and the plates to crack, which is expensive and dangerous. If this contraction was uniform in all parts of the boiler, the damage would be but little, but, unfortunately for the boiler, the contraction is confined to that part of the boiler which is in contact with the cold water, and sooner or later this will ruin the best boiler. This apparatus supplies boilers with water several degrees above boiling point, generating steam as it enters, and being so near the temperature and gravity of the water in the boiler, it is soon diffused and mingles with it, thus a more uniform temperature is maintained, and the damage caused by contraction is avoided, the life of the boiler is greatly prolonged, and boiler repairs much lessened. Hard firing or forcing boilers is also very injurious. By the use of the Steam Jacket feed-water boiler the boilers are fed with water that is already boiling, and are thereby relieved of the worst portion of their work.

UTILIZING EXHAUST STEAM.

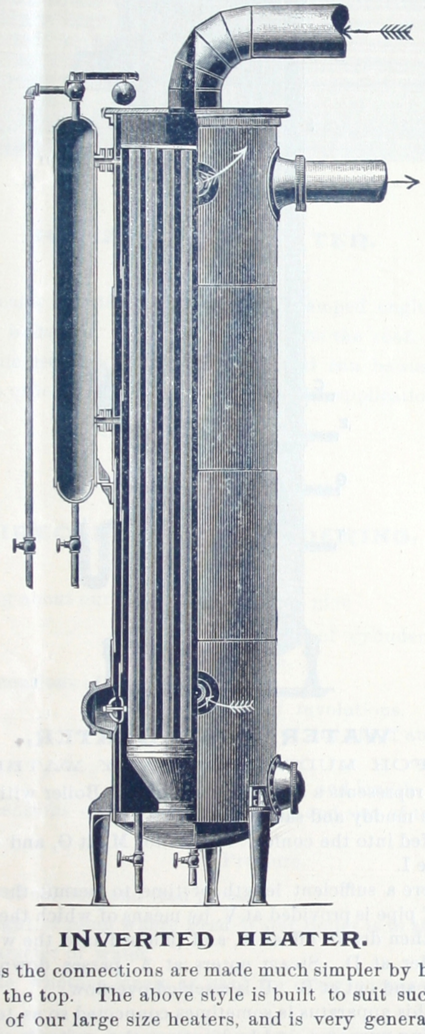
Many establishments have occasion to use large quantities of hot water, which is heated in tanks by live steam. By the proper utilization of the exhaust which escapes, all the hot water required can usually be furnished without expense. The Steam Jacket Boiler is the only thorough exhaust utilizer. For every pound of exhaust steam passed through it under fair conditions, it will boil five pounds of water. This fact is of the utmost importance to breweries, packing houses, factories, and hotels. Our apparatus is very generally used in breweries to not only boil the feed-water, but also to supply hot water required for washing kegs, and for brewing purposes. Laundries use it to heat the water for their machines besides feeding the boilers. Factories, packing houses, hotels and all other establishments requiring considerable quantities of hot water find it invaluable. The water is raised to the boiling point in from six to ten minutes after starting the engine, and until then little or no exhaust escapes. If of sufficient size the Baragwanath feed-water boiler will either boil the water or condense all the exhaust. The size of boiler required should be estimated not only from the amount of exhaust it is to receive, but also from the quantity of water it will be required to heat.

DURABILITY.

All engineers know the trouble so common in ordinary heaters from leaky tube ends. The reason for this is that the shell is exposed to the air, while the tubes are in contact with the hot steam. The shell and tubes therefore expand and contract unequally, and the straining causes the ends to work loose and leak. In our feed-water boiler both the shell and tubes are in contact with the hot steam and neither are exposed to the air. They expand and contract together, therefore, and all straining is avoided. When brass tubes are used, the slight variation in the degree of expansion between the brass tubes and the iron shell, is provided for by our spring tube-sheets, which are made slightly concave, as shown in this cut:

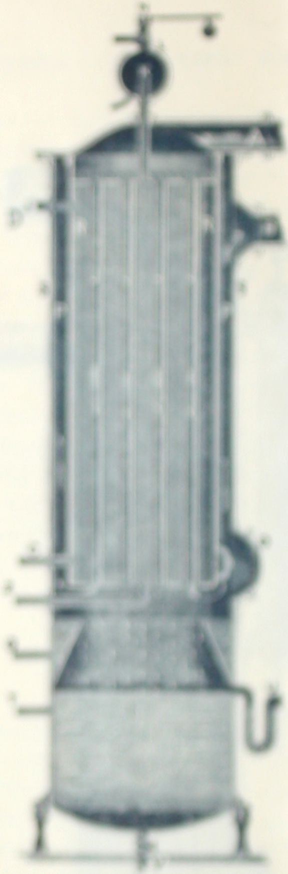


We use heavy brass tubes. They neither collapse nor work loose at the ends. Twelve years' use of our feed-water boilers has demonstrated that for strength and durability they have no equal.



INVERTED HEATER.

In many places the connections are made much simpler by having the exhaust enter and leave at the top. The above style is built to suit such locations. The cut represents one of our large size heaters, and is very generally used in rolling mills and blast furnaces. Built only to order. Dimensions and prices same as regular style.



WATER BASE HEATER,

FOR MUDDY OR SANDY WATER.

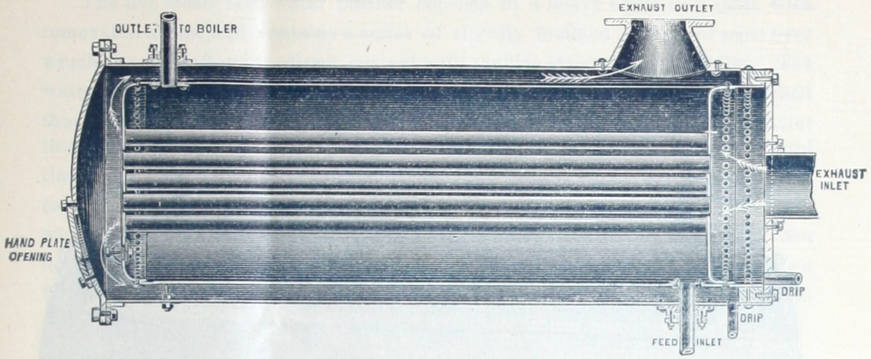
The above cut represents a sectional view of our Boiler with settling chamber, adapted for use on muddy and sandy water.

The water is fed into the central distributor M, at O, and overflows in a thin sheet into the base I.

It remains there a sufficient length of time to permit the mud and sand to settle. A blow off pipe is provided at V, by means of which the mud is blown out.

The water is then drawn off at N and pumped into the water chamber at C, passing to the boiler at D. Steam enters at A, passes downward through the tubes [illegible], and up and out at B. [illegible] is a sealed overflow.

In breweries this apparatus is sometimes connected so as to use well water in the base for washing purposes, and hydrant or other water in chamber for boiler feed. Prices and dimensions on application.



HORIZONTAL HEATER.

This style of Heater was designed for use in cramped engine rooms. It can be set on top of the boilers in saddles, or hung from the roof. It is especially convenient for marine use, as it is not top-heavy, and can be suspended from the deck. Built only to order. Prices and dimensions on application

DIRECTIONS FOR ORDERING.

In writing about our Feed-Water Boilers, give

1st. Dimensions of Engine,
  - Diameter of cylinder.
  - Stroke.
  - Style.
  - No. of revolutions.
  - Point of cut-off, if any.

2d. Dimensions of Boilers,
  - Number
  - Diameter and length.
  - Number and size of tubes.
  - Style.
  - Pressure.

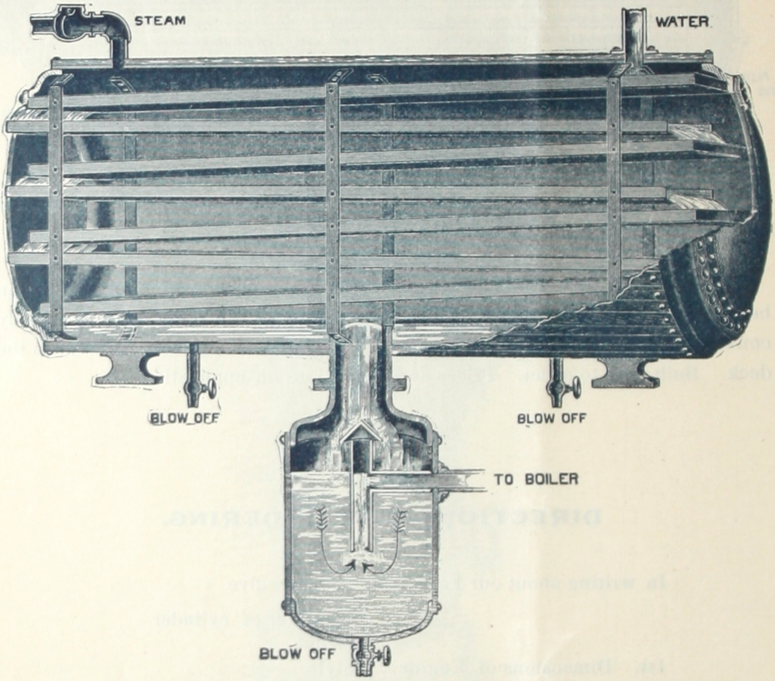
3d. Size of exhaust and feed pipes.

4th. Height of room where Feed-Water Boiler is to stand.

5th. Character of water.

6th. State whether steam is used for other purposes than running engine.

7th. State whether hot water is required for other purposes besides feeding boilers, and if so, in what quantities.



THE BARAGWANATH LIVE STEAM FEED-WATER SUPERHEATER AND PURIFIER.

The Superheater and Purifier is not designed to do away with the exhaust steam feed-water heater, but rather as an auxiliary to it in certain cases, as:

1st. Where heaters are used, which, from improper construction, inferior design or inadequate size do not boil the water.

2nd. Where water is used which contains impurities that cannot be removed by boiling.

3rd. Where no exhaust is available.

In such cases the Superheater will be found invaluable.

Briefly stated, it heats the water up to the temperature of that in the boiler, and precipitates the scale on readily accessible and removable shelves before passing the water into the boiler at all.

The live steam feed-water purifier consists of a heavy boiler iron shell, with removable heads, and contains a series of slightly inclined shelves or pans over which the water flows in direct contact with the live steam from the boiler. The water is heated to nearly the same temperature as that in the boiler, and when thus heated, precipitates its impurities in the form of scale on the shelves. After thus flowing backward and forward the full length of the superheater several times, the water falls to the bottom of the superheater, which is arranged to act as a settling chamber, and retain the heavier particles of scale, mud or sand, which may be carried over the shelves by the flow of water. The water then flows into the lower settling chamber which is so arranged that the water is drawn from a point half way between the surface and the bottom, thus retaining both the scum and any mud which may have passed through the first settling chamber. Suitable blow-offs and hand-plates are provided.

The heads are provided with plugs, through which the interior may be easily examined.

When the shelves have become coated with scale so as to interfere with the flow of water, the heads are taken off, and the shelves drawn out and cleaned. The bottom of the superheater, and the settling chamber, should be washed out at the same time.

The Superheater should be set level, at a height above the boiler sufficient to secure a proper flow of the water, which is by gravity alone.

The steam and feed pipes connecting the Superheater with the boiler should not be contracted, as it is essential that there be free and open communication between the superheater and boiler.

All sizes are manufactured.

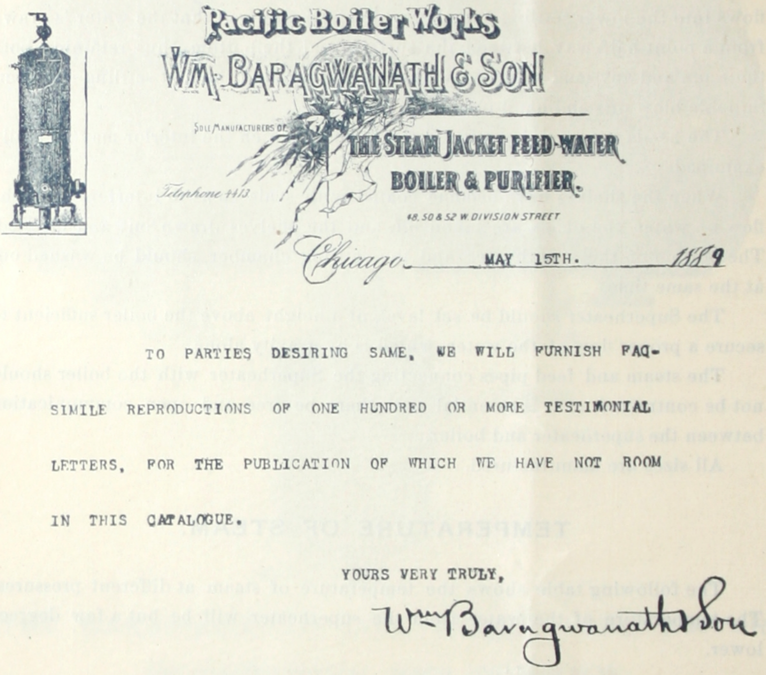
TEMPERATURE OF STEAM.

The following table shows the temperature of steam at different pressures. The temperature of the water from the superheater will be but a few degrees lower.

At atmospheric pressure 212° Far.

5	lbs. above	228	55	lbs.	306° Fah.
10	"	241	60	"	311
15	"	251	65	"	315
20	"	260	70	"	320
25	"	269	75	"	324
30	"	276	80	"	328
35	"	283	85	"	332
40	"	289	90	"	335
45	"	295	95	"	339
50	"	301	100	"	342

* * *



Pacific Boiler Works
Wm. Baragwanath & Son
Sole Manufacturers of
The Steam Jacket Feed-Water
Boiler & Purifier.
Telephone 4413
48, 50 & 52 W. Division Street

Chicago, MAY 15TH. 1889

TO PARTIES DESIRING SAME, WE WILL FURNISH FACSIMILE REPRODUCTIONS OF ONE HUNDRED OR MORE TESTIMONIAL LETTERS, FOR THE PUBLICATION OF WHICH WE HAVE NOT ROOM IN THIS CATALOGUE.

YOURS VERY TRULY,

Wm. Baragwanath & Son

* * *

HINTS ON TESTING.

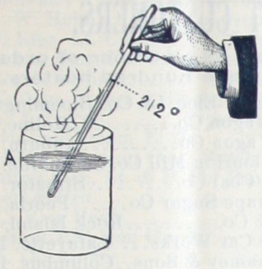


FIG. 1.

Fig. 1 shows a simple method of testing thermometers. In an open can of boiling water, at the sea level, it should show 212° F. For every 500 ft. above the sea level the boiling point falls about one degree. Thus at an elevation of 500 ft. above the sea level, the true boiling point is 211°, at 1,500 ft. 209° F., etc.

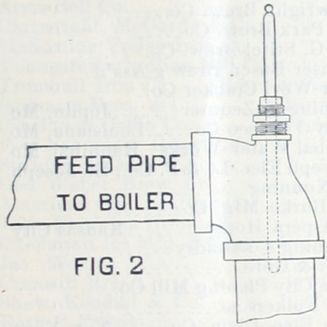


FIG. 2

Tests of feed-water from our boilers must be made under pressure as shown in Fig. 2. Water drawn from the boiler itself will not show over 212° in the open air. The Thermometer should be inserted so that the current will strike the bulb.

Figs. 3 and 4 shows simple devices for holding thermometers.

Fig. 3 shows a long cup closed at the bottom and threaded for screwing into the feed-pipe. It is partially filled with mercury before inserting thermometer. This cup should be made of iron, which best resists the corrosive influence of the mercury.

It is a very handy arrangement, as the thermometer can be inserted and removed while running. A degree or two is usually lost by this method of testing.

Fig. 4 shows a stuffing box arrangement. It is the most accurate of all methods of testing, as the thermometer is brought in direct contact with the water. Its drawbacks are the trouble of removing thermometer, and the liability to breakage.

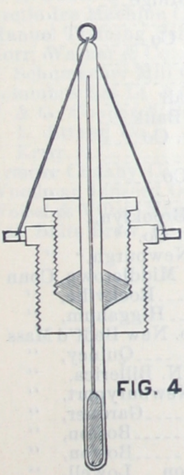


FIG. 4

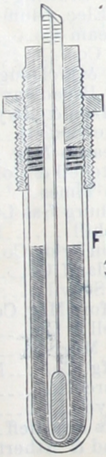


FIG. 3

PARTIAL LIST OF PROMINENT CUSTOMERS.

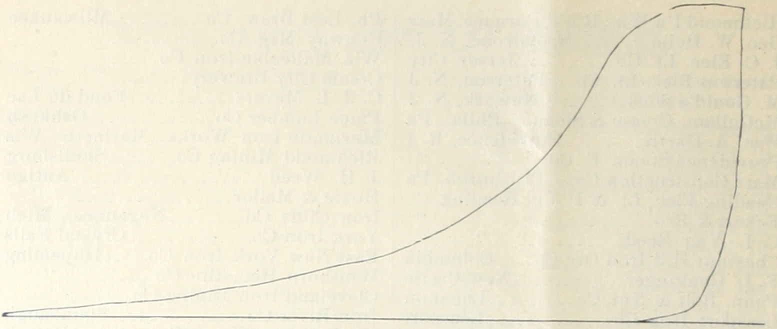
The majority of these customers have given us a number of orders, some having purchased of us as many as one hundred heaters.

Joliet Steel Co	Joliet, Ill
Armour & Co	Chicago
Fraser & Chalmers	"
Jas. S. Kirk & Co	"
Consolidated Ice Mach. Co	"
J. Davis & Co	"
Board of Trade	"
Fortune Bros., Brew. Co.	"
Rialto Building	"
A. J. Kirkwood & Co.	"
C. Kaestner & Co	"
J. Moore & Son	"
West Side Brew. Co	"
McAvoy Brew, Co.	"
Geo. Bullen & Co	"
Wacker & Birk Brew. Co	"
Cooke Brew. Co.	"
Van De Poele Elec. Mfg. Co	"
Wm. M. Hoyt & Co.	"
P. W. Gates Iron Works	"
Dale Building	"
Walker, Oakley & Co.	"
C. C. Railway Co.	"
Johnson Chair Co	"
Custom House	"
Soper Lumber Co.	"
Chicago Times	"
Cook County Hospital	"
Davis & Rankin,	"
City Hall	"
Pullman Building	"
Louis Hutt	"
Chicago Sash, Door & Blind Co	"
Chicago Copper Refining Co	"
Thompson's Restaurant	"
Northwestern Parlor Suit Co.	"
Maxwell Bros	"
Donahue & Henneberry	"
E. Smeeth	"
A. Plamondon Mfg. Co	"
Libby, McNeal & Libby	"
Phœnix Distilling Co	"
Union League Club,	"
Argyle Flats	"
Pickwick Flats	"
Palmer House	"
Geo. C. Morgan	"
Manual Training School	"
Cook & Rathburne	"
Major Block	"
N. K. Fairbank & Co.	"
N. W. Insurance Building	"
Royal Insurance Building,	"
Illinois Leather Co	"
Crane Bros., Mfg. Co.,	Chicago & Pitts
Equitable Gas Lt. & Fuel Co	Chicago
Hibbard, Spencer & Bartlett	"
E. O. Standard Mill Co	Alton, Ill

Bloomington Elec. Lt. Co.	Bloomington
Moline Wagon Co.	Moline, Ill
Weber Wagon Co	Auburn, Ill
Yaeger Flouring Mill Co.	Carlinville, Ill
Coal Run Coal Co.	Streator, Ill
Peoria Grape Sugar Co	Peoria, Ill
J. Volk & Co	Rock Island, Ill
Lafayette Car Works	Lafayette, Ind
W. W. Mooney & Sons	Columbus, Ind
F. W. Cook Brew. Co	Evansville, Ind
Chris. Mueller	Davenport, Iowa
DesMoines Edison Lt. Co.	DeMoines "
E. O. Standard Mill Co.	St. Louis, Mo
Jos. F. Wangler & Co	"
Wainwright Brew. Co.	"
Hyde Park Brew. Co	"
Chas. G. Stifel Brew. Co.	"
Anheuser-Busch Brew'g Ass'n	"
Dozier-Weyl Cracker Co.	"
Muenning & Zeutner	Joplin, Mo
Tinsley Tobacco Co	Louisiana, Mo
Hannibal Water Works	Hannibal, Mo
St. Joseph Elec. Lt. & P. Co.,	St. Joseph
Aug. Nunning	"
H. C. Burke Mfg. Co	"
Gillis Opera House	Kansas City
E. Jenning's Laundry	"
Chapin & Gore	"
Kansas City Planing Mill Co.	"
M. J. Fulkerson	"
Edison Elec. Illum. Co	New York
J. Dwight & Co.	"
Eureka Fire Hose Co	"
N. Y. & Brooklyn Bridge	"
Hermann Brewing	"
Harlem Elec. Illum. Co	"
N. Y. Steam Co	"
Cooke & Co.	"
Ketcham & McDougall	"
National Broadway Bank	"
Sterling Iron & Rwy. Co	"
Am. Bible Society	"
E. P. Gleason Mfg. Co	"
R. G. Mitchell & Co.	"
Brooklyn Times	Brooklyn, "
Williamsburg Gas Lt. Co.	" "
R. Whitehill	Newburgh, "
Berlin Iron Br'dg Co.	Middletown, Conn
New England Co	Rockville, "
D. & H. Scovil	Higganum, "
New Bedford Mfg. Co.	New Bedf'd Mass
McDonnell & Co	Quincy, "
Faulkner Mfg. Co.	N. Billerica, "
Towle Mfg. Co.	Newburyport, "
S. K. Pierce	Gardner, "
E. B. Mayo	Boston, "
Codman & Shurtleff	Boston, "
Whitehead & Atherton	Lowell, "

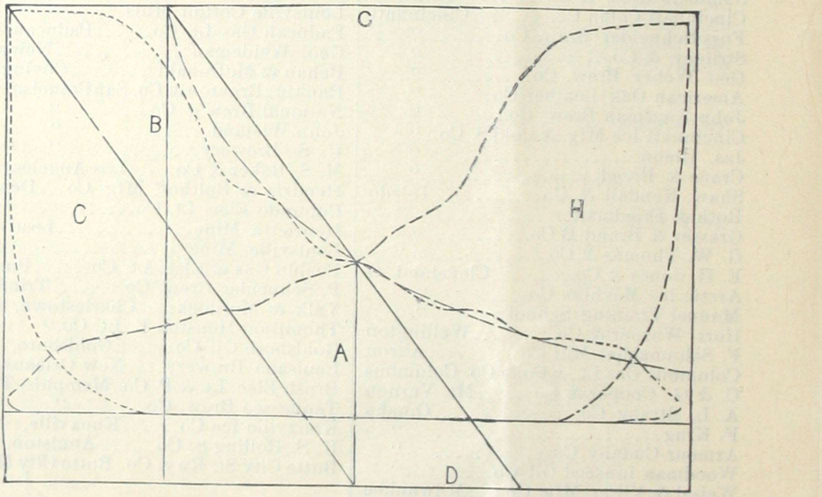
Richmond I'n Wks, R'h'd Furnace, Mass
Geo. W. Helm........Spotswood, N. J.
J. C. Elec. Lt. Co..........Jersey City
Paterson Elec. Lt. Co...Paterson, N. J
M. Gould's Sons.........Newark, N. J
McCullam, Crease & Sloan...Phila., Pa
Wm. A. Harris........Providence, R. I
Providence Steam E. Co. " "
Marr Construction Co...Pittsburgh, Pa
Reading Elec. Lt. & P. Co. Reading, "
Eckert & Bro............... " "
C. L. Van Reed.............. " "
Chestnut Hill Iron Ore Co....Columbia
F. L. Genkinger.............New Castle
Penn. Bolt & Nut Co..........Lebanon
Leesport Iron Co.............Leesport
E. & G. Brooke Iron Co......Birdsboro
H. G. Fink...............................Erie
The Andrews Bros. Co. Youngstown, O
Arms Bell Co.......... "
Cartwright, McCurdy & Co. "
Mahoming Valley Iron Co. "
Youngstown Rolling Mill Co. "
Trumbull Iron Co.,...Girard & Warren
Summers Bros. & Co..........Struthers
Cincinnati Coffin Co..........Cincinnati
Foss-Schneider Brew. Co.... "
Stribley & Co.............. "
Geo. Weber Brew. Co....... "
American Oak Leather Co... "
John Kaufman Brew. Co..... "
Cincinnati Ice Mfg. & Cold S. Co. "
Jas. Glenn.................. "
Crane & Breed............... "
Shaw, Kendall & Co............Toledo
Roth & Friedman.............. "
Grasser & Brand B Co.......... "
G. W. Thomas & Co............ "
E. H. Jones & Co..........Cleveland, O
Arctic Ice Machine Co.... "
Manuel Training School... "
Horr, Warner & Co..........Wellington
F. Schumacher Mill Co............Akron
Columbus Gas Lt. & Coke Co. Columbus
C. & G. Cooper & Co......Mt. Vernon
A. L. Strang Co...................Omaha
F. Krug.......................... "
Armour-Cudahy Co............. "
Woodman Linseed Oil Co...... "
Weisel & Vilter Mfg. Co....Milwaukee
Val. Baltz Brew. Co........ "

Ph. Best Brew. Co..........Milwaukee
Conway Mfg. Co............ "
Wis. Malleable Iron Co..... "
Cream City Brewery......... "
C. J. L. Meyers...........Fond du Lac
Paine Lumber Co.................Oshkosh
Marinette Iron Works..Marinette, Wis
Richmond Mining Co.........Shullsburg
J. H. Weed.............................Antigo
Hoxie & Mellor.................. "
Iron Cliffs Co.........Negaunee,, Mich
York Iron Co...............Crystal Falls
East New York Iron Co.....Ishpeming
Winthorp Hematite Co....... "
Cleveland Iron Mining Co.... "
Iron River Co................Stambaugh
W. J. Chittendon & Co............Detroit
Stockwell & Darragh, F. Co.,
Grand Rapids
Mastodon Mine...............Mastodon
Winona Water Works...Winona, Minn
Bohn Mfg. Co........................St. Paul
Soldiers' Home....Leavenworth, Kans
Leavenworth Coal Co. " "
Frank Fehr..................Louisville, Ky
Louisville Cotton Mills... " "
Paducah Gas Lt. Co........Paducah, Ky
Geo. Weideman..................Newport
Behan & McDonald............Covington
Rankin, Brayton & Co. SanFranciso, Cal
National Brew'g Co... "
John Wieland........... "
U. S. Brewery.......... "
M. S. Baker & Co.....Los Angeles, Cal
Hendrie & Bolthoff Mfg· Co...Denver
Colorado Elec. Lt. Co............ "
Henrietta Mine...................Leadville
Louisville Mine.................. "
Pueblo Gas & Elec. Lt Co..........Pueblo
P. Schneider Brew. Co.........Trinidad
Valk & Murdock....Charlestown, S. C
Thompson-Houston E. Lt. Co." "
Goldsboro Oil Co.......Goldsboro, "
Louisana Brewery....New Orleans, La
Brush Elec. Lt. & P. Co. Memphis, Tenn
Tennessee Brew. Co.... " "
Knoxville Ice Co.......Knoxville, "
U. S. Rolling S. Co....... Anniston, Ala
Butte City St. Rwy. Co. Butte City Mont



TEMPERATURE WITH THIS CARD 214° F.

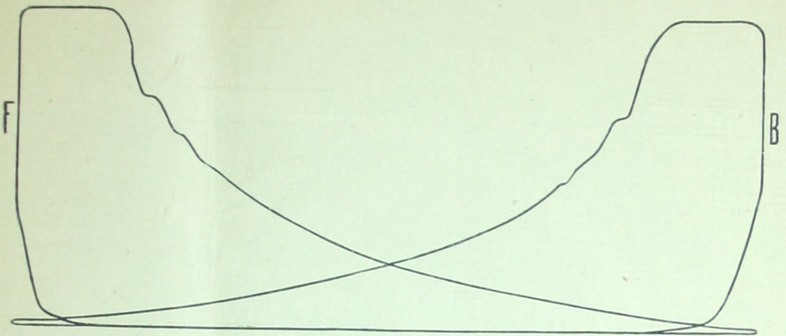
This card was taken from an 18x42 Harris Corliss engine, in the chair factory of Messrs. S. K. Pierce & Son, South Gardner, Mass., Steam pressure, 73 lbs. Revolutions per minute, 60. Scale, 40. When this card was taken, the thermometer, (which was made by Tagliabue, of New York, and tested by the engineer), recorded a temperature of 214° Fah.



TEMPERATURE WITH THIS CARD 216° F.

From engine 9x14, 95 lbs. steam, 225 revolutions per minute, scale 40, Oct. 15, 1885, temperature of feed-water to 125 h. p. boilers, delivered by this Heater was 216° F. Signatures on original: H. S. Brown, M. E., in charge; W. T. Hunter, engineer; L. M. Foster.

The above indicator diagrams were taken from the Buckeye engine, at American Institute Fair, New York, October 15, 1885, while running electric light. The engine exhausted through a Baragwanath Steam Jacket Feed-Water Boiler and Purifier. The temperature of feed-water, as is attested by the signatures given, was 216° F. and the indicator (Thompson Improved) shows plainly no back pressure. The thermometer used was made, tested and guaranteed correct by C. J. Tagliabue, 35 Fulton Street, New York.

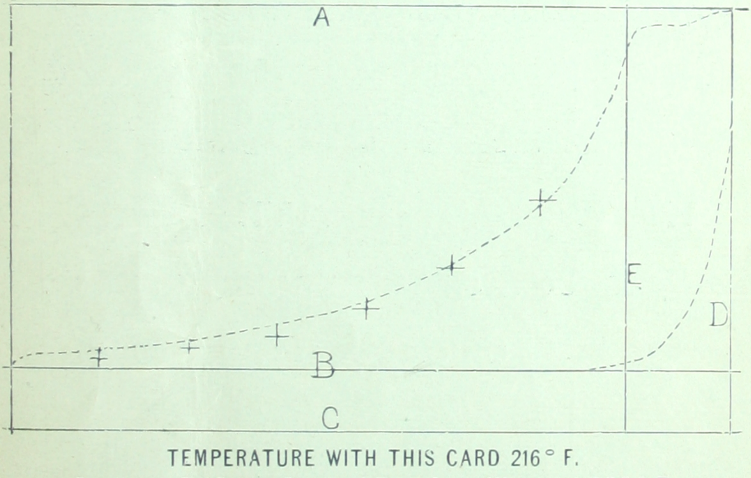


18″ x 42″. Steam 60. Spring 30. Revolutions 60.

Memorandum of Test made at the Works of the Link-Belt Machinery Co., 11 to 23 South Jefferson Street, Chicago, September 2nd, 1887. Engine connected with No. 6 Baragwanath Heater.

Temperature of Feed Water............213.5 F.
Back Pressure..........................None.

[Signed] T. F. DOWD, Engineer.

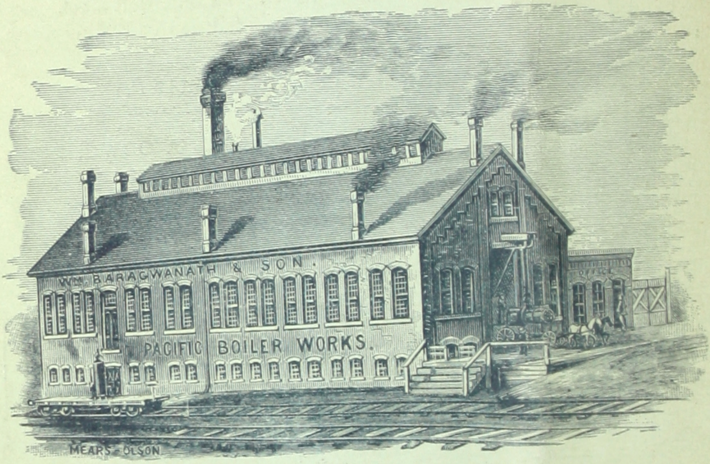


TEMPERATURE WITH THIS CARD 216° F.

Saving 8 6-10 Per Cent. of Fuel Over Water at 200° F.

This card is from a C. H. Brown automatic cut-off engine at E. B. Mayo's building, Boston, Mass. Diam. of cylinder 28 in., stroke 48 in., steam pressure 81½ lbs., revolution 58½, which exhausts through a Baragwanath Feed-Water Boiler and Purifier. The temperature of the feed-water with this card was 216° F. This thermometer was made by Huddlestone, of Boston, and warranted correct.

PACIFIC BOILER WORKS.


WM. BARAGWANATH & SON.
PACIFIC BOILER WORKS.
OFFICE
MEARS-OLSON

WM. BARAGWANATH & SON.

48, 50 & 52 W. DIVISION ST.,

CHICAGO, ILL.